Japan: the Geology of the Country and the Language of its People by **Edward S. Simpson**, D.Sc., B.E.

(Abstract of an address *delivered* May 12, 1925. *Published* July 30, 1925.)

In a brief introduction the geography of the Japanese Empire was outlined. The main islands with an area of 151,000 square miles stretch from Lat. 31½° to 46° and exhibit a great range of temperature. The rainfall is heavy throughout and provides innumerable rivers in a heavily wooded and unusually mountainous country.

Geology of Japan: Until Tertiary times Japan was probably part of the main continent of Asia. The backbone of the islands is of granite flanked on both sides with greenstone schists of Keewatin age passing into Huronian meta-sediments. This Archaean area occupies about 15 per cent of the whole country, and is traceable at intervals from Sakhalin right through to southern Kyushu.

Steeply inclined Palaeozoic slates and quartzites overlie the Archaean, the boundary not yet clearly defined, but trilobites and other characteristic fossils have been found in many places. Carboniferous limestones with *Fusulina* are known at Yamaguchi (Hondo) and elsewhere, but no coal of this age is known.

The south eastern portions of Kyushu, Shikoku and the Yamato peninsula are characterised by a large development of Mesozoic rocks, particularly of the Cretaceous age.

The Tertiary era was cataclysmic, Japan being separated from the mainland and opened up into several portions by rift valleys. At the same time a large number of volcanoes burst through the slates and schists from one end of the country to the other, along four main intersecting lines. These attained their zenith in Pleistocene times, many cones rising over 8000 feet, with accumulations of ashes and flows of lava which is mainly andesite, rarely basalt or liparite. Volcanic cones cover 21% of the area of the country, and Tertiary and post-tertiary sediments, including much volcanic debris, cover a further 46%.

Miocene beds yielded in 1923 about 29 million tons of black coal and hold reserves of 8000 million tons. These are chiefly in N. W. Kyushu and Southern Hokaido. The petroliferous beds of western Hondo are Upper Eocene, and yielded 157,000 tons of oil in 1923. The main metalliferous deposits are also associated with these volcanic intrusions, gold, silver, copper, zinc, and lead being important products.

Many vents are now quite extinct, but during the last 50 years 17 have been more or less violently active, the most famous being Aso and Asama Fuji, the highest (12,390 feet) has not erupted since 1707.

Innumerable hot springs are still flowing and disastrous earthquakes occur from time to time, especially in northern and central Hondo. The most recent, that of Tokyo in 1923, was by far the worst on record, causing the destruction directly by shock, or indirectly by fire, of 575,000 houses, and the death of 143,000 persons. The focus of this was 50 miles S. of Tokyo in Sagami Bay. It was caused by a sudden movement along a N. N. W. tectonic line under the influence of immense pressure from the S. E. The bed of Sagami Bay was seriously affected, about 250 square miles being depressed an average of 39 fathoms, and 85 square miles elevated an average of 45 fathoms. Slight elevations of the shore were also noted.

Japanese Language: Although the Chinese character is largely used in writing Japanese, the two languages are not of the same type or origin; Japanese belonging to the Ural-Altaic group, and Chinese to the Indo-Chinese group. Further, Chinese is isolating in structure, and Japanese semi-inflected. Just as English is written with Roman character and has added a large number of Latin derivatives to an original Anglo-Saxon stock, so Japanese has built up a primitive national language by adding many Chinese derivatives, and largely utilises the Chinese ideographs. The independent origin is easily recognised in the words representing primitive concepts, e.g., Jap. tsuki, Ch. yuerh (moon); Jap. yama, Ch. shan (mountain); Jap. futatsu, Ch. urh (two). The first important influx of Chinese words was due to the return from China of students of philosophy and crafts in the early 8th century. Continuous additions have been made since then, even now many technical terms being built up from Chinese roots as we are doing from Greek, e.g., denwa (telephone) from Chinese den (lightning) and wa (conversation).

In the last half century a large number of English scientific

proper and commercial words have been adopted in their Japanese form, e.g., Osutaria (Australia), beriru (beryl), machi (match). Occasional words are found of French, Italian, or Latin origin.

Of the far-eastern nations, Chinese had ideographs from prehistoric times. On the basis of these the Koreans devised an alphabet, but built up their words into monograms simulating Chinese ideographs. The Japanese first attempted a form of writing on the Korean model but abandoned it, and in the 2nd century adopted Chinese ideographs, applying them to identical concepts, but calling them by the Japanese names. For example, the Chinese ideograph for mountain would be used in writing by both Chinese and Japanese, but the former would read it as "shan," the latter as "yama." Chinese books were first circulated in Japan about 285 A.D.

The written language was devoid of the spoken inflexions until the 8th century, when two syllabaries were invented, viz. Hiragana by Kobo Daishi, a Japanese abbot who had studied in China, and later the Katakana by Kukai.

A syllabary is possible only to a language built up of very few syllables. The Japanese recognise 51 pure syllabic sounds, viz., the five vowels a, e, i, o, u; and 45 others formed by suffixing each of these to each of the nine consonants h, k, m, n, r, s, t, w, y. The fifty-first syllable is "un," a terminal syllable in which the vowel is almost always elided. Five further consonants are looked upon as only modifications of the pure ones, viz., g (derived from k), d (t), b and p (h), z (s), and the corresponding symbols in the syllabaries are indicated by diacritical marks, following the "pure" syllabics. This gives a total of 76 syllables in two forms, script (hiragana) and print (katakana).

In writing, the syllabics were at first only used as inflexions following a root written in Chinese. They are now, however, very largely used for all purposes, especially in manuscript, shop signs, etc.

St. Francis Xavier reached Japan in 1549 and was the first to use a romanised transcript of the language in his scriptures. His transcript was, however, quite different to the present one. It was largely adopted by the numerous converts to christianity, and was first used in a printed book (A Life of Christ) in 1591. Under the name of Romaji it continued to progress until banned by the reactionary Shoguns (military dictators) in the 18th century. In spite of this it slowly crept

into use again during the early part of the 19th century. With the Japanese renaissance (Meiji, 1868) Dr. Hepburn revised the Romaji to its present form, with European vowels, and English consonants, stabilising it by the publication of a large dictionary.

There is now a Society for the Propagation of Romaji which publishes a monthly magazine. Further, all railway station names are duplicated in Romaji, and many shop signs, etc., are treated similarly. Every school boy learns English and therefore becomes accustomed to the Roman character, and the general impression is that before long Romaji will completely supersede the Chinese ideographs and Japanese syllabics, both of which are now found freely intermixed in all newspapers, books, and public signs.

Printed for the Royal Society of Western Australia by R. S. Sampson, 971-973 Hay Street, Perth.